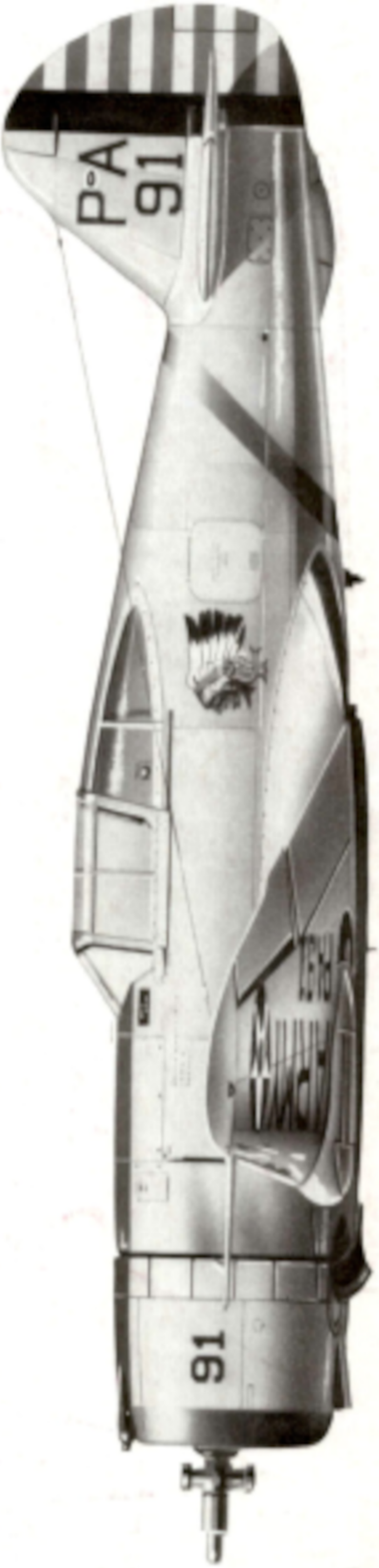
PROFILE PUBLICATIONS

The Curtiss Hawk 75

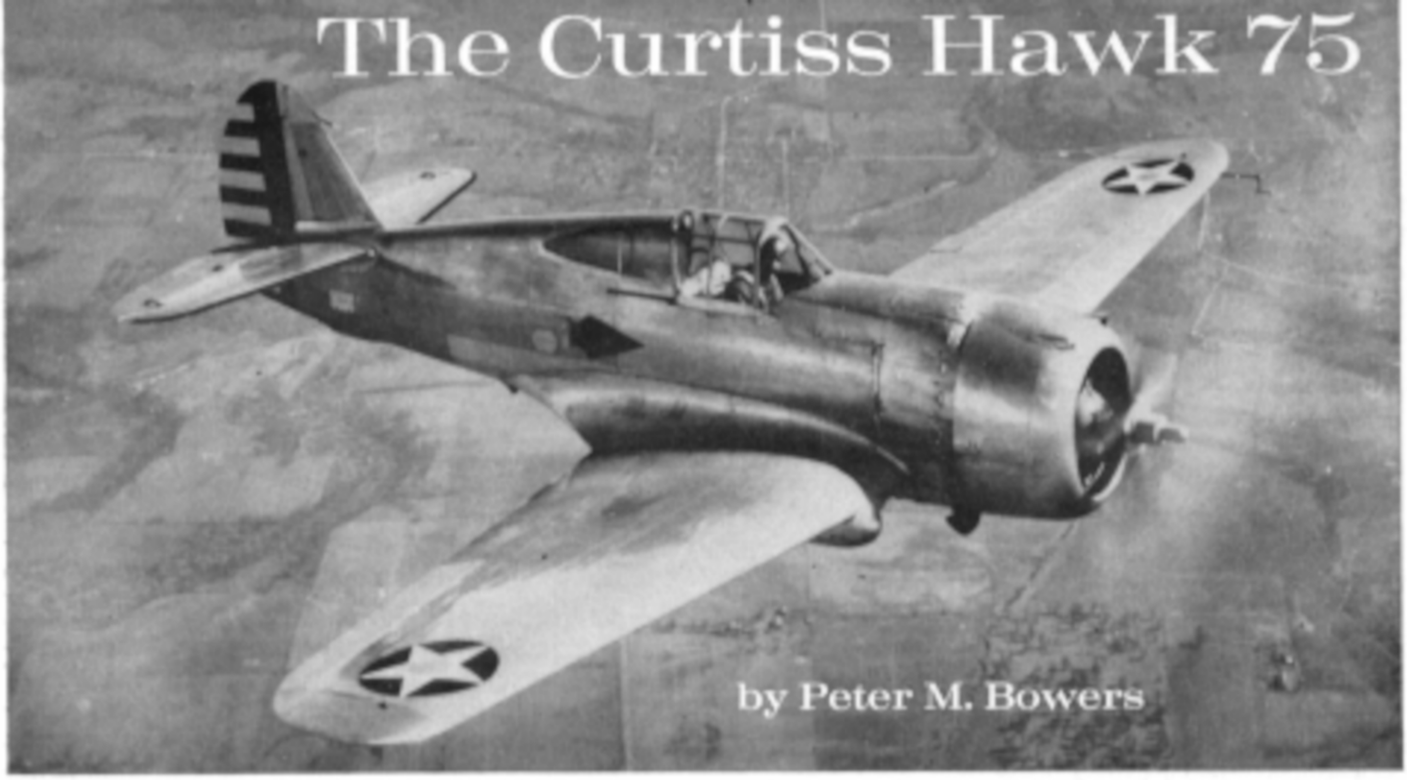


NUMBER 80

3 SHILLINGS

The Curtiss Hawk 75

by Peter M. Bowers



Y1P-36, one of three service-test Curtiss 75s ordered as a result of the design competition. The arrowhead insignia on the fuselage is the emblem of Wright Field, the Air Corps Test Centre. (Photo: U.S.A.F.)

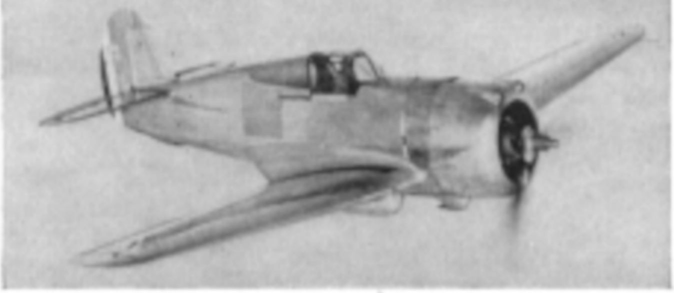
The Curtiss Model 75, known to the U.S. Army Air Corps as the P-36 and to the R.A.F. as the "Mohawk", was the first of the "Modern" single-seat fighters to enter U.S. military service. In accordance with the Air Corps policy of the time, it was developed simultaneously with a similar model, the Seversky P-35. While both were great advances over their immediate predecessor, the Boeing P-26 (*Profile* No. 14), they were obsolescent by the time the U.S. entered W.W.II. P-35s were the main defensive force in the Philippines while P-36s fought the Japanese at Pearl Harbour. Those models still in U.S. service after the opening months of U.S. involvement were relegated to training duties while those that had been delivered to other nations were likewise withdrawn from active combat areas, except in the case of Finland, by the end of 1942.

However, the exported Curtiss 75s saw wide military service in all theatres of the war and probably served in more different air forces than any other pre-W.W.II design. The fortunes of war put the Hawk 75 in a unique situation—significant numbers were used by both sides at various times during the war.

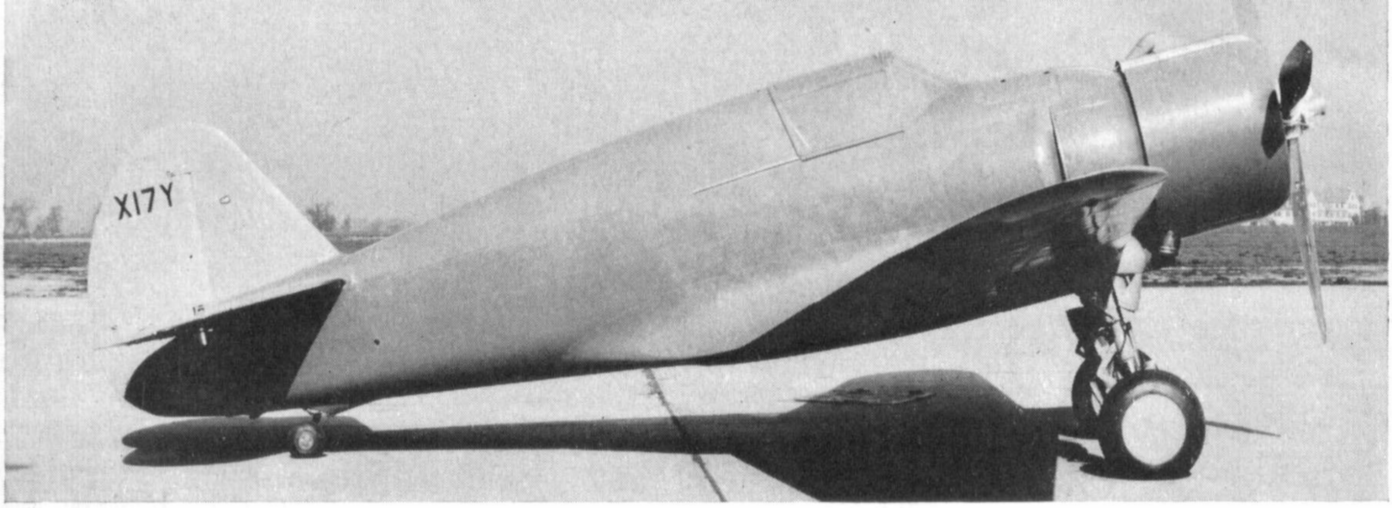
ORIGIN OF THE DESIGN

By 1930 it had become apparent that the traditional fighter biplane had nearly reached the limit of its development. Such refinements as enclosed cockpit and retractable undercarriage could do little to prolong its life in the rapidly advancing age of the speedy monoplane. The United States was the first to put fighter monoplanes into full-scale military service. Curtiss and Boeing both developed experimental prototypes for evaluation, but only the Boeing, designated the P-26, was adopted. This was strictly a transitional design, and had many features that placed it simultaneously in both the "Old" and the "New" design eras. However, the P-26 gave the Air Corps experience with the new fighter monoplane and a clearer picture of just what its design requirements were. These resulted in the establishment of a design competition, to be held in 1935. Eventually, four competitors were to appear—Curtiss, with an entirely new Model 75; Seversky, with a fighter version of the famous two-seat amphibian of 1933; Chance Vought, with the V-141, an improved version of the Northrop Model 3A that it had purchased from Northrop; and Consolidated, with a single-seat conversion of the then standard PB-2A two-seat fighter.

The first Hawk 75A-1 built for France, photographed during the initial test-flying period when the only markings carried were French tail stripes. Apart from modified armament and a commercial powerplant, the export 75A series was similar to the U.S. Army Air Corps P-36A. (Photo: Curtiss-Wright)



The Curtiss design was not only new as far as the Air Corps was concerned, it was new for Curtiss. None of its major features were to be found in earlier company products. Even the powerplant was new. This was a 14-cylinder twin-row air-cooled Wright radial of 1,670 cubic inch displacement producing 900 h.p. The aircraft structure was all metal with metal skin on all but the movable control surfaces, which were fabric covered. Portions of the outer wing structure were sealed to provide flotation in case of forced landing in water. Hydraulically-actuated split flaps were fitted to the trailing edge of the wing. The Curtiss 75's undercarriage was unique among the competitors. The single strut under each wing rotated aft hydraulically to place the wheel inside the wing, but at the same time, pivoted about its axis to turn the wheel ninety degrees so that it would lay flat in the thinner aft portion of the wing. The Seversky rotated the strut aft in the same manner but did not pivot it, so half of the wheel projected into the airstream. The Vought and Consolidated designs retracted the wheel inward towards the fuselage so that the wheels lay flat. Vought later adopted the Curtiss system for the SB2U



The original form of the Curtiss 75 prototype as entered in the Air Corps design competition of May 1935, with the twin-row Wright R-1690 powerplant. (Photo: Curtiss-Wright)

"Chesapeake" and F4U "Corsair". Actually, although not used by that manufacturer, the "Swing-aft-and-pivot" undercarriage had been developed by Boeing, which received a royalty for all installations used by other manufacturers.

The armament of the Curtiss, and the other competitors, followed the U.S. standard that had prevailed since shortly after W.W.I—a single ·30 calibre and a single ·50 calibre machine gun synchronised to fire through the propeller. New European designs then in the development stages featured far greater firepower, but the U.S. held to the same standard for several more years.

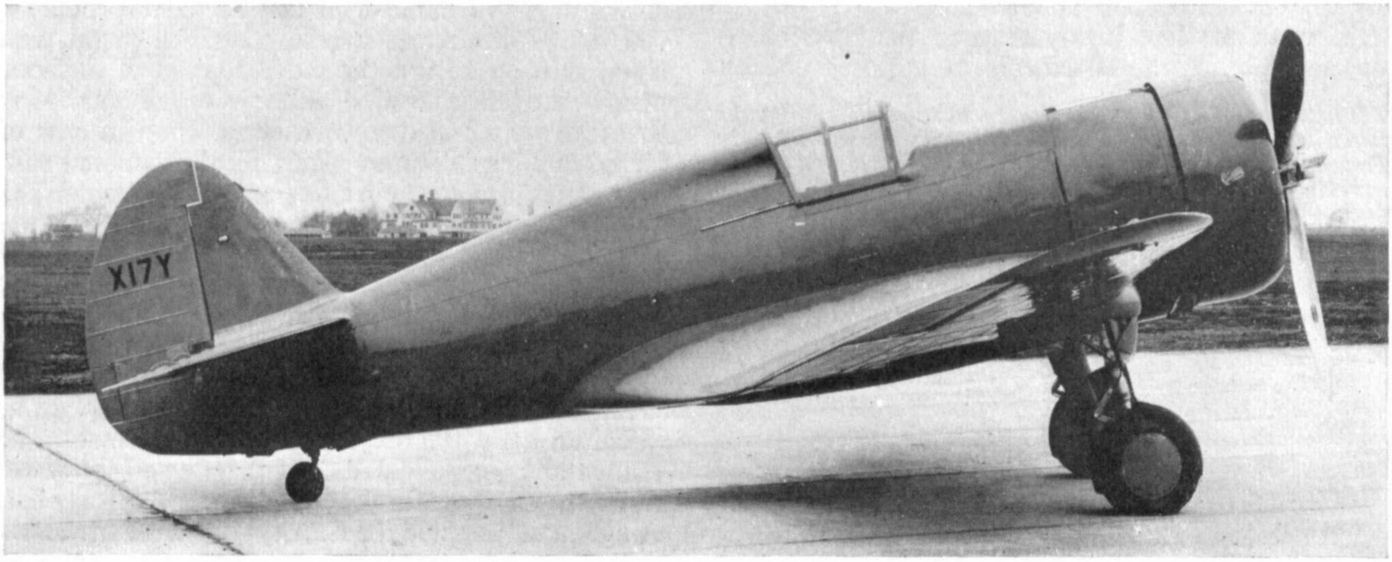
The Curtiss 75 was the only competitor ready on the contest date of May 1935. The Seversky was not ready in time and was granted a delay to August, much to Curtiss' chagrin. Preliminary testing by the Air Corps revealed many shortcomings in each design that were cause for rejection as a service fighter, so a postponement was granted to allow each manufacturer to make improvements. Both changed engines; the Seversky replaced its 850-h.p. 9-cylinder Wright "Cyclone" radial with a 14-cylinder twin-row Pratt & Whitney R-1830 "Twin Wasp" of the same power while Curtiss replaced the experimental Wright R-1670 with virtually the same Wright "Cyclone" that Seversky had abandoned. In its final version, the Curtiss 75 prototype was known as Model 75B. The other competitors were on hand for the final judging, and the winner was the Seversky. A production order was placed for seventy-seven production versions under the designation of P-35. A few months later, Curtiss was given a Service Test order for three "Twin Wasp"-powered versions of the 75B under the designation of Y1P-36. While there had been an experimental prototype, there never was an actual XP-36 designation because the machine was company-owned and did not carry a military designation.

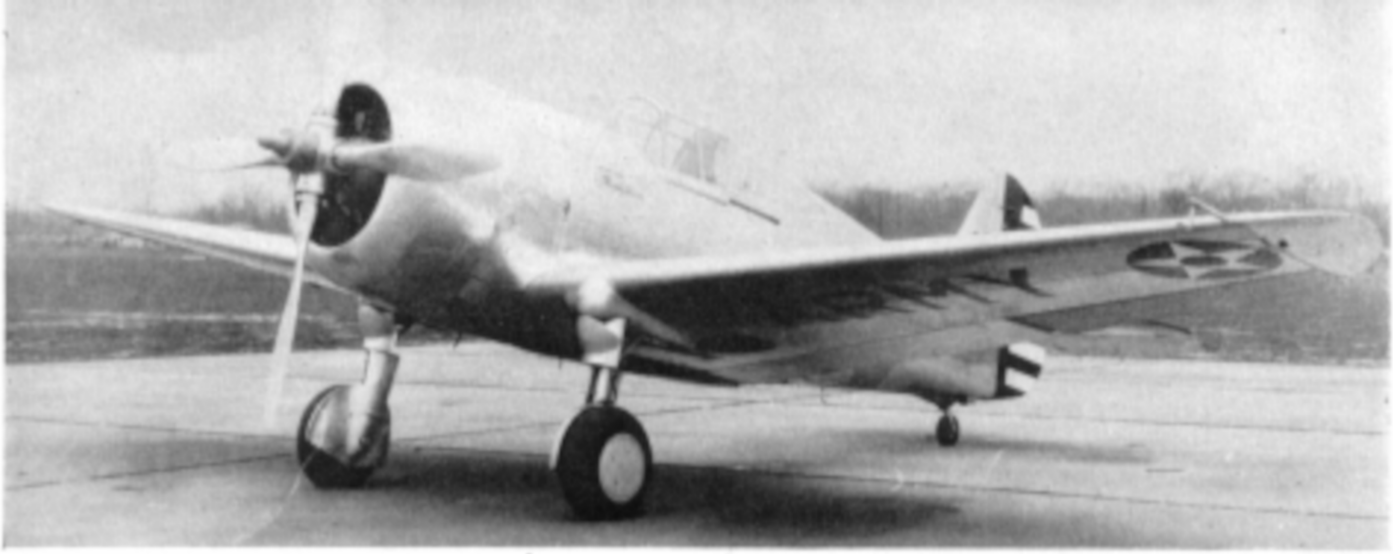
CURTISS MODEL 75 DEVELOPMENT

Some confusion has prevailed over the years as to the proper designation of the Curtiss Model 75 and its many variations. This resulted from different organisations within the company handling the designations a bit differently. In company advertising of the period, the fixed-undercarriage export models were mostly referred to as "Model 75" while the export models with retractable undercarriage similar to the prototype and the production P-36 were known as "Model 75A". Actually, 75A was an intermediate designation used before the final configuration of the prototype appeared in the form of the 75B. There were many other sub-designations assigned by the engineering department and used for detailed identification within the factory. The entire 75 series is detailed in the following paragraphs, which also cover the service histories of each sub-model.

MODEL 75. First prototype. Design initiated in 1934, with actual construction beginning in November. Flight testing began in May 1935. This was a company-owned machine and did not carry military markings. The civil registration number was X-17Y,

The 75 prototype in its final form, March 1936; the twin-row engine replaced by a single-row Wright "Cyclone", and slight recesses in the fuselage aft of the pilot's head to give a degree of rear vision. (Photo: Curtiss-Wright)





Curtiss Model 75E, one of three tested by the Air Corps as Y1P-36. The machine illustrated, serial 37-68, has been fitted with an experimental four-blade Curtiss electric propeller. (Photo: U.S.A.F.)

which, by coincidence, immediately preceded that of the Seversky design, which carried X-18Y. The designation "Hawk 75" was used by the sales and publicity departments when referring to the simplified fixed-undercarriage versions of the design.

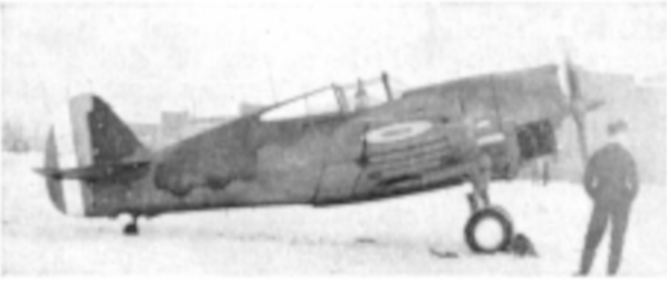
MODEL 75A. Intermediate designation of the prototype during the Air Corps competition but best known as the principal designation of the export versions of the retractable-undercarriage design. These export models had the basic model number preceded by the prefix "H" as follows:

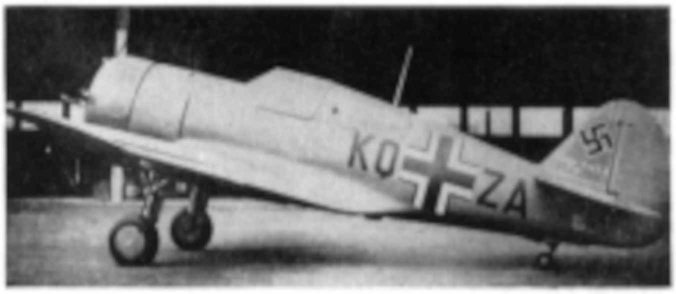
H75A-1. 100 equivalents of the standard Air Corps P-36A ordered by France in May 1938, but using the 1,050-h.p. P. & W. R-830-SC-3G "Twin Wasp" engine. Detail differences were the fitting of two 7·5-mm. Browning machine guns in the nose and an additional 7·5-mm. gun in each outer wing panel. Instrumentation was in the metric system and some of the furnishing and equipment were to French, rather than U.S., standards, including a reverse-acting throttle. As delivered from the factory, the H75A-1s were finished in natural metal with French roundels on wings only and the standard French stripes on the rudder. The manufacturer, model designation, and serial number were spelled out in black on each side of the rudder as follows:

CURTISS
H75-C1
No. 77

The C-1 was the standard French abbreviation for a *Chasse*, or pursuit, machine while the figure 1 indicated it to be a single seater. The number 77 identified the seventy-seventh machine of that model built for the Armée de l'Air.

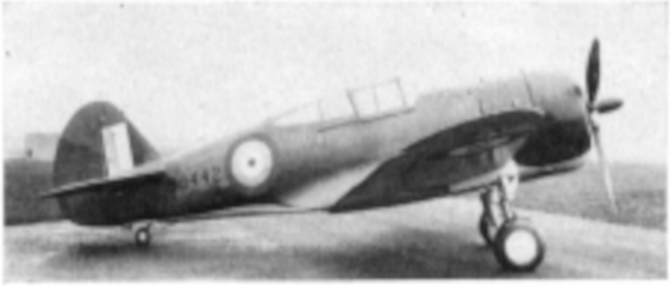
The first victories of the French over German aircraft in W.W.II were won by H75A-1s over the Western Front on 8th September 1939. However, the "Hawks" were outmatched by the standard German fighter of the time, the Messerschmitt Bf-109E. After the collapse of French resistance, those "Hawks" which had not escaped to unoccupied French territory, North Africa, or England were taken over by the Luftwaffe. Unsuitable for anything but training by Western European standards, some found their way back to combat areas following sale to Finland. A few H74A-1s that came under British control were taken

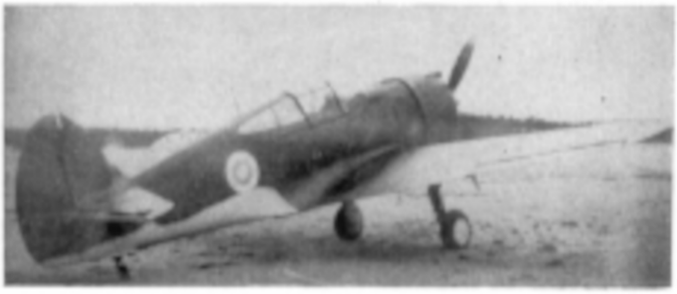


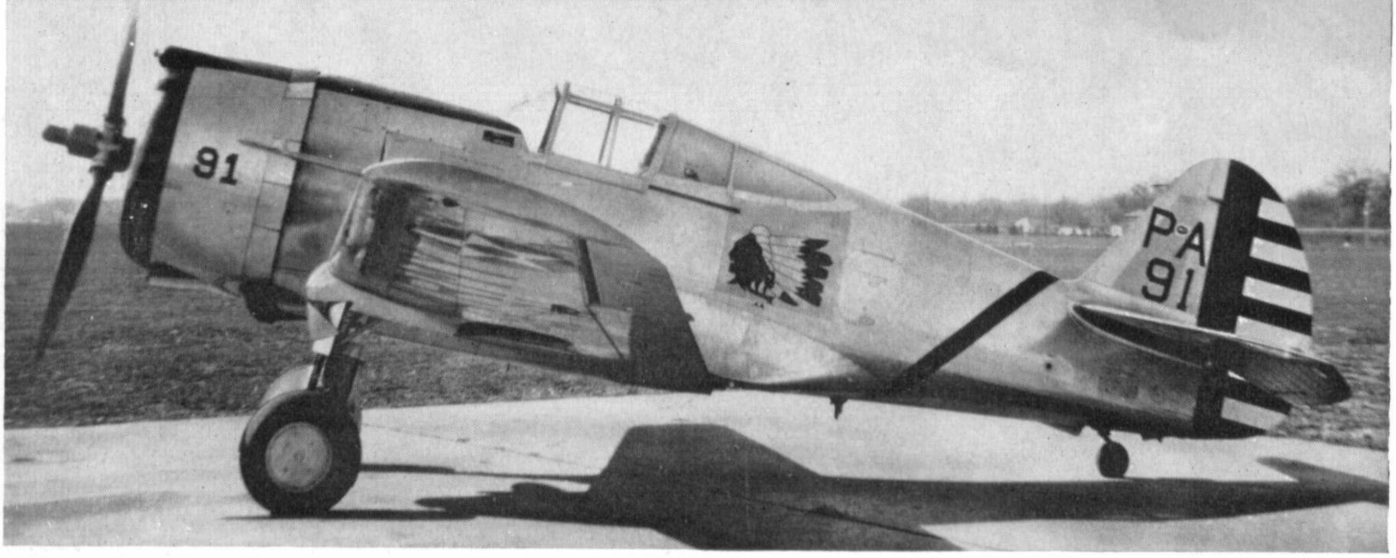


Left: *Hawk H75A-2 of* l'Armée de l'Air*; compare wide rudder stripes with those on the aircraft illustrated at the foot of page 3, where the stripes were kept aft of the rudder hinge line.* (Photo: courtesy Charles W. Cain.) Right: *A Cyclone-powered H75A-4 taken over by the* Luftwaffe *for training use after the fall of France in 1940.* (Photo: courtesy H. J. Nowarra)

Left: *A Cyclone-powered H75A-4 taken into the Royal Air Force as "Mohawk IV". Cyclone variants could be identified by the larger diameter, narrower-chord cowling, and the absence of "blisters" over the nose gun muzzles.* (Photo: Crown Copyright.) Right: *An H75A in the markings adopted by the Finnish Air Force subsequent to 4th September 1944. Germany sold thirty-six "Twin-Wasp"-powered H75A-1s, -2s and -3s from France and eight H75A-6s from Norway to Finland for use against the Russians.*
(Photo: courtesy Charles W. Cain)







P-36A of the 94th Pursuit Squadron, First Pursuit Group. The squadron is identified by the insignia, the Group by the letters on the tail. The aft-sloping fuselage stripe identifies the leader of "C" Flight. (Photo: U.S.A.F.)

into the R.A.F. as "Mohawk Is".

H75A-2. An additional 100 "Hawks" on 1938 French orders, similar to the -1 except for the use of a 1,050-h.p. P. & W. R-1830-S1C3G engine, which made it more like the Air Corps' P-36A. The armament was increased by an additional 7·5-mm. Browning in each wing, matching the firepower of the experimental XP-36D. French serial numbering of the -2s continued from where it had ended at the last -1, and again initial delivery was in natural metal finish. The combat record of the -2 was the same as the -1, with those impressed into the R.A.F. after evacuation from France becoming Mohawk IIs.

H75A-3. A further 135 "Hawks" identical to the -2s except for an improved 1,200-h.p. P. & W. R-1830-SC3G engine. Since deliveries were under way at the time of the French capitulation, many were undelivered. Some that were en route at the time were diverted to French possessions. Some merely rotted away where they were unloaded while others were evacuated from the West Indies to Morocco, where they were refurbished and used for training by the Free French forces. Those still in the factory when France fell were delivered to England as Mohawk IIIs.

The Mohawk IIIs were refitted with British equipment, including ·303 calibre Browning machine guns. Since they were inferior to the Hurricanes and Spitfires then in service, they were used for reserve duties prior to being shipped to India early in 1942. Earlier, a number had been sent to South Africa while others went to Portugal.

H75A-4. The final French order was for 395 -4s powered with the 1,200-h.p. "Cyclone" R-1820-G205A and equipped and armed as the -2s and -3s. Those taken over by the R.A.F. became Mohawk IV and were treated the same as the IIIs. A single "Cyclone" Hawk, not actually an H75A-4, was built in India by the Hindustan Aircraft Company as the first of forty-eight to be built under licence from Curtiss. When the programme was discontinued, the single pilot model was impressed into the R.A.F.

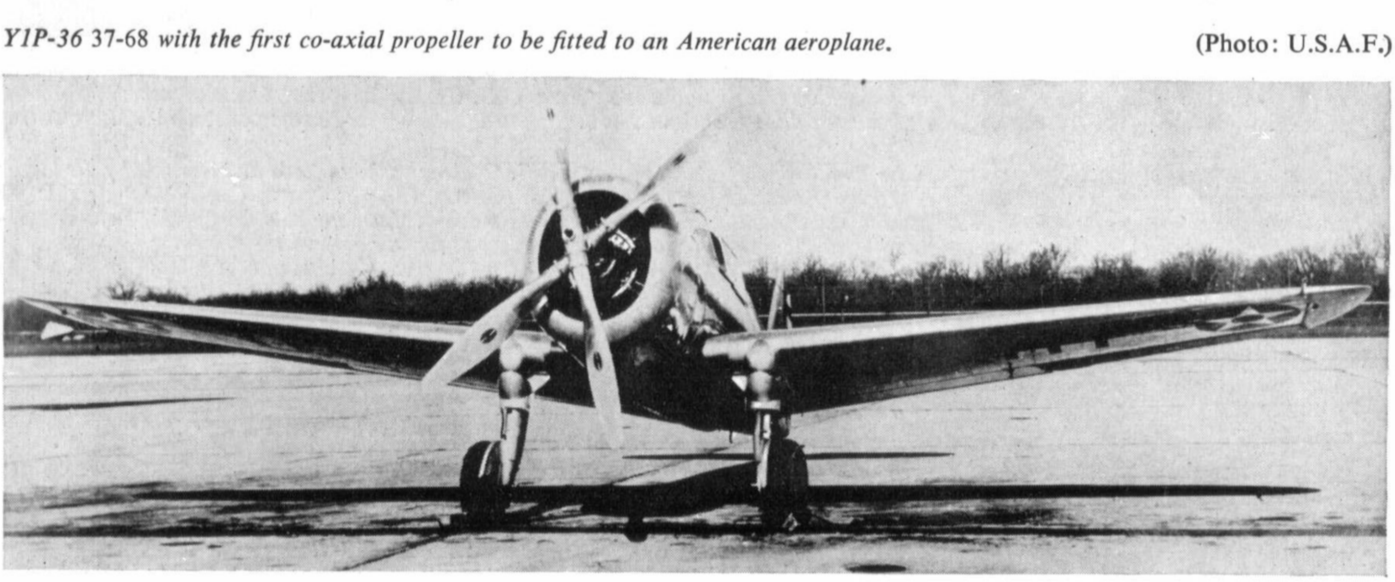
H75A-5. Curtiss built only one "Cyclone"-powered H75A-5. This machine was supplied as a pilot model to the Chinese Government along with materials kits for an unspecified number of similar machines. Considering the conditions in wartime China, it is not surprising that nothing has been heard of the accomplishments of the H75A-5.

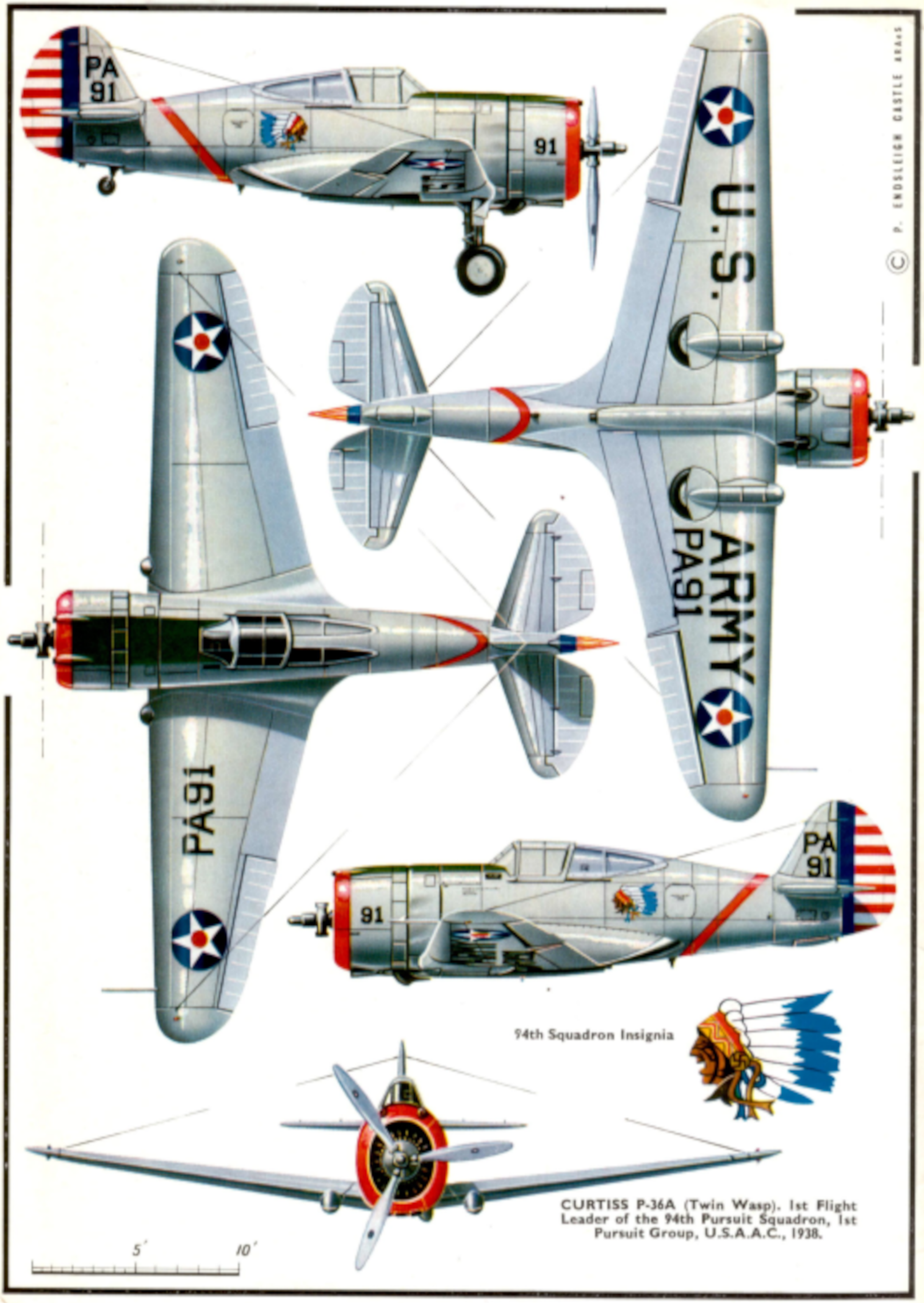
H75A-6. Twenty-four "Twin Wasp" Hawks armed with four 7·9 mm. Brownings ordered by Norway. Deliveries were interrupted by the German invasion. Some of the delivered machines were taken over by the *Luftwaffe* and eight were eventually sold to Finland. Others still in the United States were diverted to Free Norwegian forces in Canada for use as trainers.

H75A-7. Twenty "Cyclone" - powered "Hawks" ordered by the Netherlands were diverted to the Netherlands East Indies after German occupation of the home country and saw combat against the Japanese.

H75A-8. Thirty-six additional "Hawks" ordered by Norway, differing from the -6s in having two 12·7-mm.

Y1P-36 37-68 *with the first co-axial propeller to be fitted to an American aeroplane.* (Photo: U.S.A.F.)

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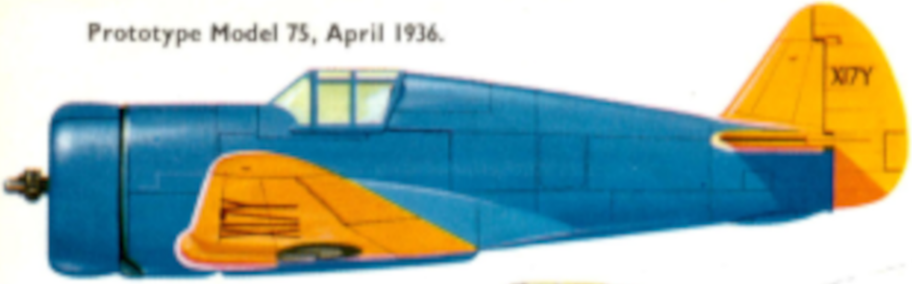
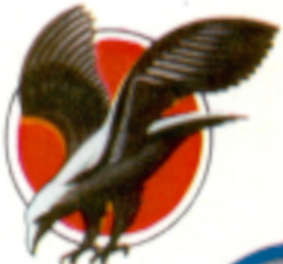
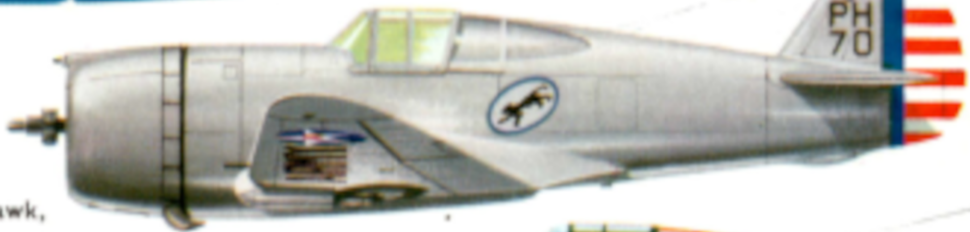
CURTISS P-36A (Twin Wasp). 1st Flight Leader of the 94th Pursuit Squadron, 1st Pursuit Group, U.S.A.A.C., 1938.

Prototype Model 75, April 1936.

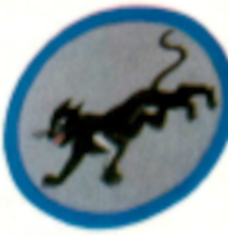


27th Pursuit Squadron.

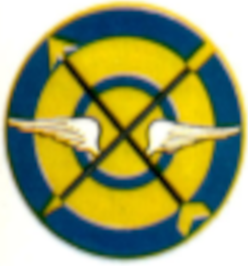




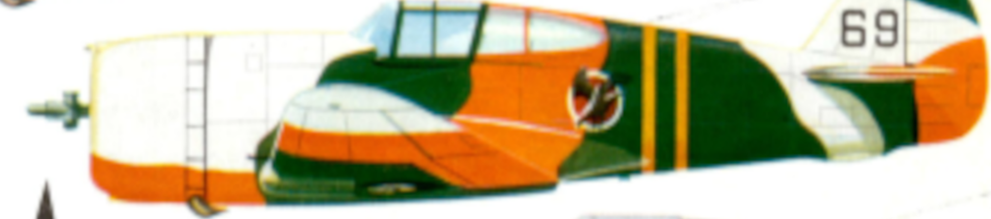
P-36A Hawk, 35th Pursuit Squadron.



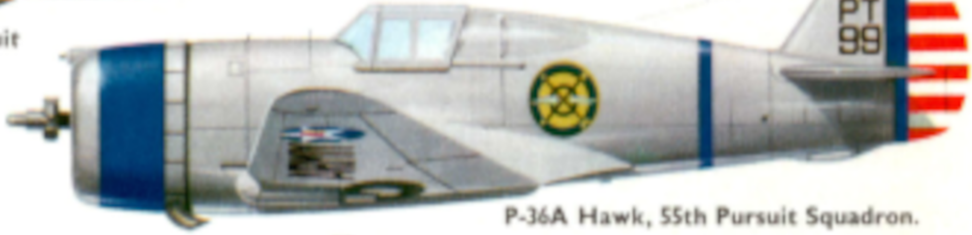
35th Pursuit Squadron.



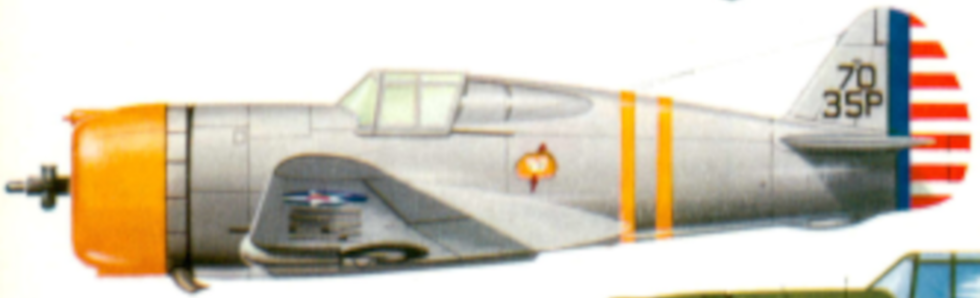
55th Pursuit Squadron.



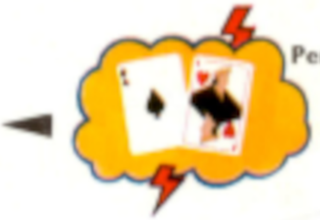
P-36A Hawk, 27th Pursuit Squadron in special 1939 War Games camouflage.



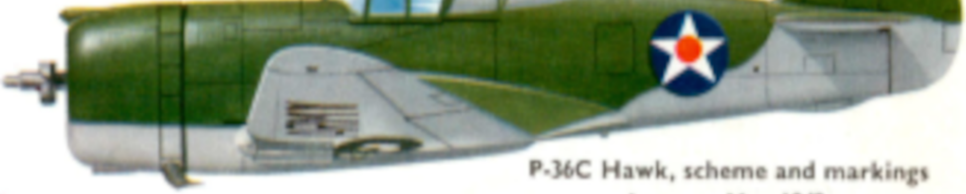
P-36A Hawk, 55th Pursuit Squadron.



P-36A Hawk, Command aircraft 35th Pursuit Group.

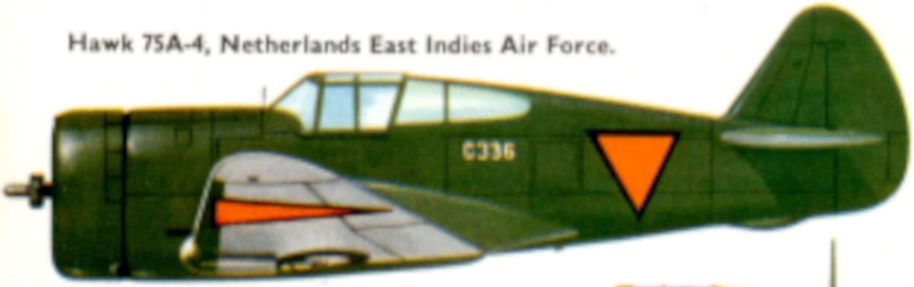


Personal insignia.

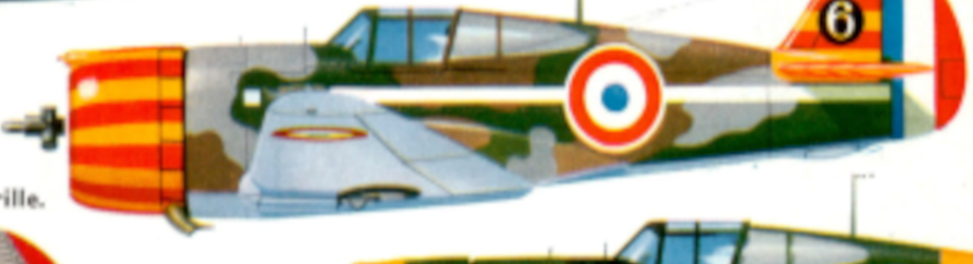


P-36C Hawk, scheme and markings January–May 1942.

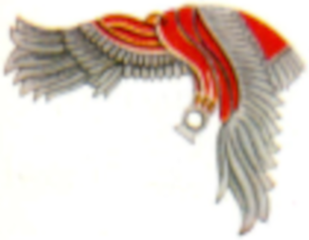
Hawk 75A-4, Netherlands East Indies Air Force.



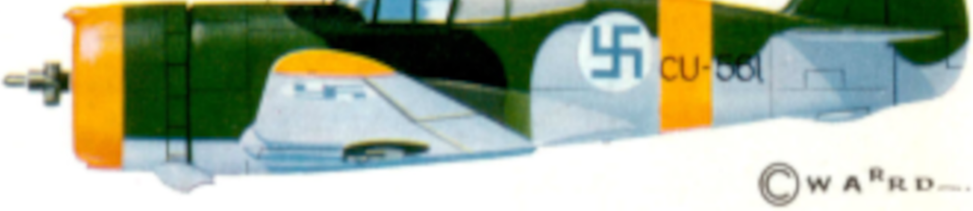
Hawk 75A-3, GC I/4, 2nd Escadrille, Vichy French Air Force.



GC I/4, 2nd Escadrille.



Hawk 75A-3, HLeLv 32, Finnish Air Force. One of a number of French Hawks captured by the Germans and sold to Finland.



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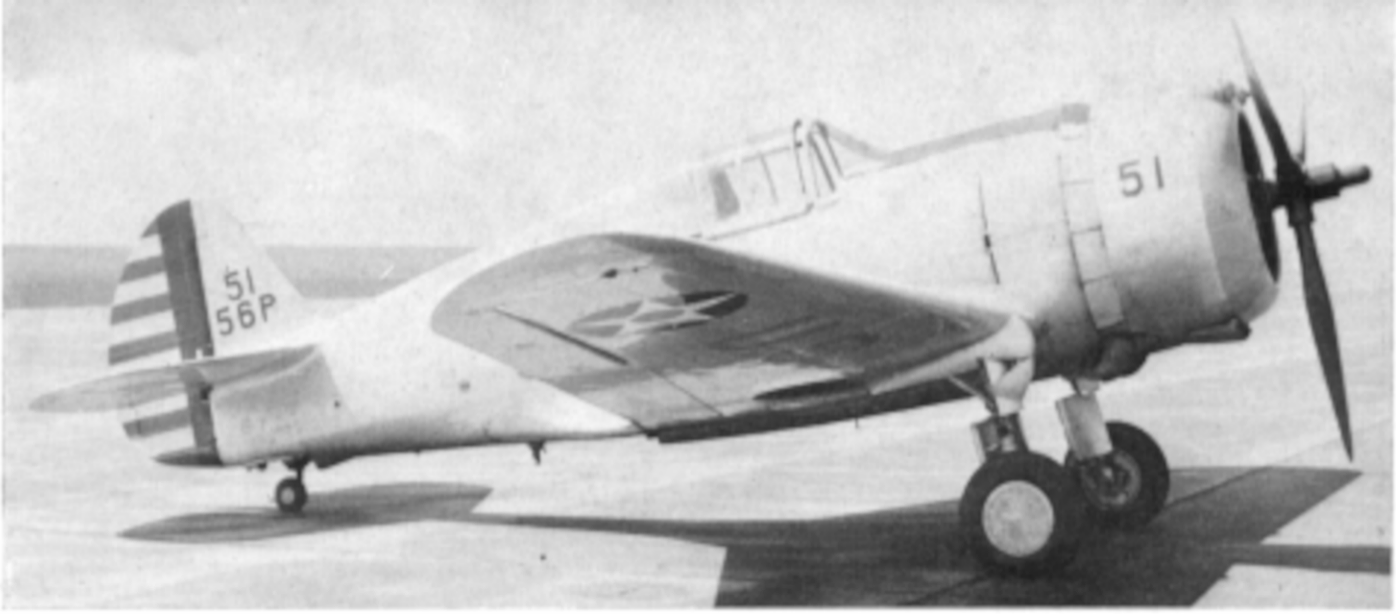
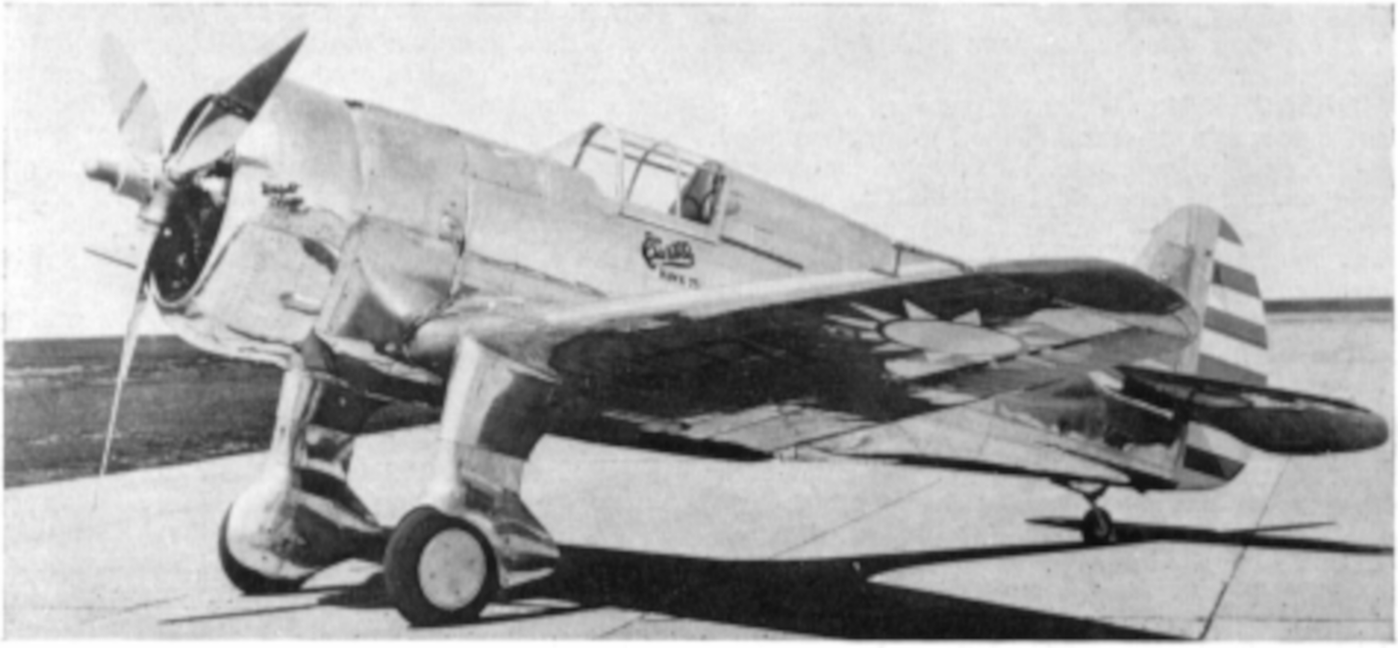


Below: *P-36A with revised tail designator of the 1940–41 period; the 51st aircraft in the 56th Pursuit Group.* (Photo: the author)



Curtiss Model 75H, first demonstrator of a simplified export version marketed as the "Hawk 75". This Cyclone-powered demonstrator was bought by China and presented to General Claire Chennault by Madame Chiang Kai Shek. (Photo: Curtiss-Wright)

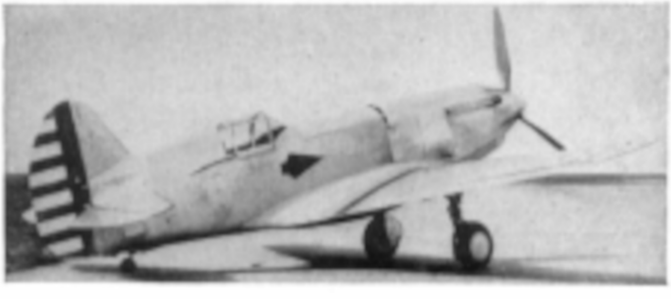
nose guns and "Cyclone" engines. Six were delivered to the Norwegians in Canada while the remaining thirty were impressed into the U.S. Army Air Corps and given the designation of P-36G (serial numbers *42-38305/38322, 42-108995/109006*). All but two of these were sent to Peru on Lend-Lease.

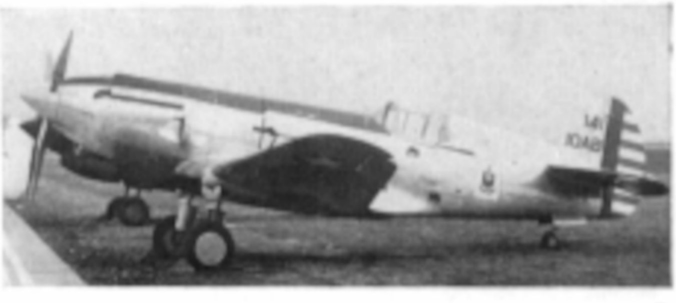
H75A-9. Ten "Cyclone"-powered "Hawks" similar to 75A-4s were delivered to Iran (formerly Persia). British forces occupied the country before the machines were uncrated and set up. They were re-shipped to India and impressed into the R.A.F. as Mohawks.

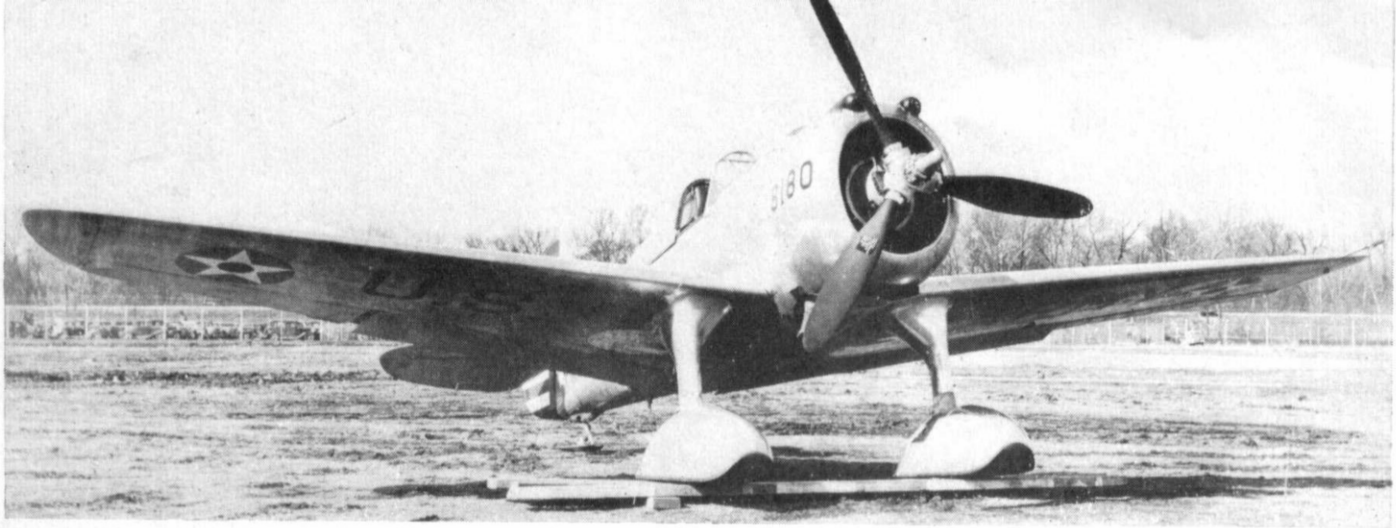
MODEL 75B. Final "Cyclone"-powered version of the prototype as flown in the final stages of the Air Corps' fighter competition in April 1936, still in civil markings. After the competition, this machine continued to be used by the Curtiss company for test and demonstration.

MODEL 75E. No C or D variants were built, the designations being assigned to studies. Model 75E was the factory designation for the three service-test Y1P-36 models. Except for the P. & W. R-1830-13 "Twin Wasp" engine, these were essentially the same as the 75B. Minor refinements were noticeable in the form of a retractable tail wheel and transparent panels at each side of the pilot's headrest to permit a degree

Left: *Curtiss Model 75I, ordered by the Air Corps as XP-37 to evaluate the new Allison V-1710 engine in a contemporary fighter design.* (Photo: Curtiss-Wright.) Right: *YP-37* 38-484, *one of thirteen ordered to service-test the Allison-engined version of the Curtiss Model 75. The designator letters on the tail indicate the 141st aircraft in the 10th Air Base Squadron at Chanute Field, Illinois, the Air Corps Service-Test Centre.* (Photo: the author)







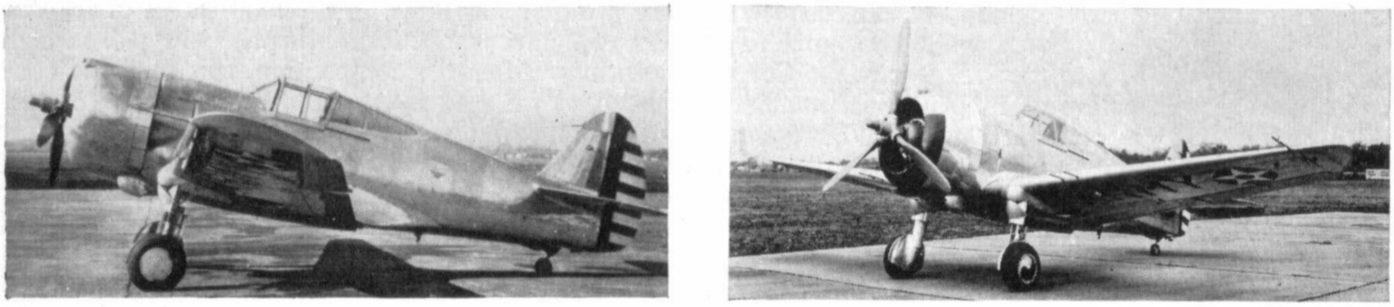
P-36A 38-180 *assigned to Wright Field for test work; a rigid landing gear fitted with streamlined metal skis has been installed.* (Photo: U.S.A.F.)

of rearward visibility. Following completion of the service testing, which began in February 1937, the Y1P-36s were redesignated plain P-36. Army serial numbers were *37-68* to *37-70*.

MODEL 75H. In 1937 Curtiss produced a simplified and lighter export version of the 75B that was fitted with a rigid undercarriage. Two demonstrators were built under the designation of 75H. The first one, registered *NR-1276*, carried Chinese markings and was bought by the Chinese Government. This was eventually presented to General Clair Chennault, formerly of the U.S. Army Air Corps, who was reorganising the Chinese Air Force before achieving his later fame as leader of the "Flying Tigers" and the 14th U.S. Air Force. The second demonstrator, registered *NR-1276*, carried Argentine markings and was sold to that country. Both carried a standard armament of one ·50 calibre and one ·30 calibre nose gun and a single ·30 calibre in each wing panel. Bomb racks were fitted under each wing panel for combinations totalling 300 pounds of bombs.

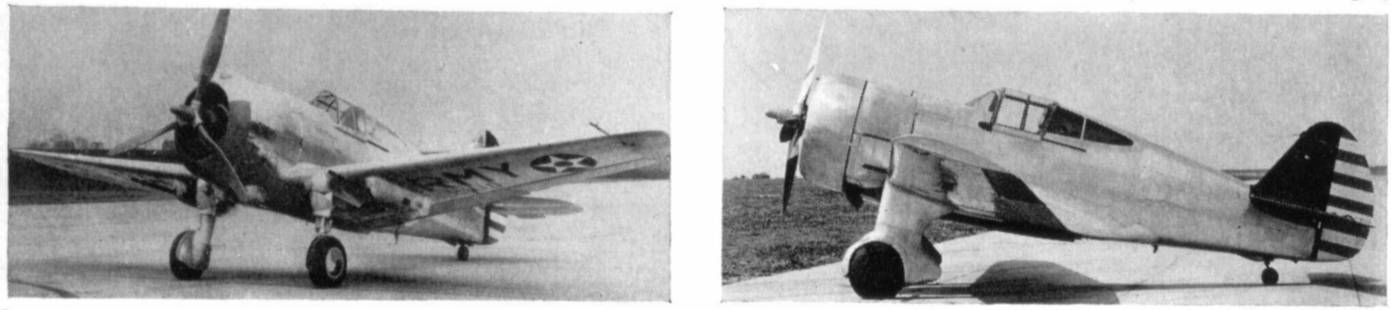
MODEL 75I. A major change in the 75 series was initiated with this model. The Air Corps had expressed interest in the streamlining advantages offered by liquid-cooled V-12 engines, and asked for designs built around the new Allison V-1710 powerplant. The first of these to appear was the XP-37 (serial number *37-375*), which Curtiss produced quickly by adapting the existing Model 75 to the new powerplant. Because of the longer nose combined with greater weight, it was considered necessary to move the pilot aft some distance to maintain proper balance. The 1,150 h.p. Allison V-1710-11 was turbo-supercharged to deliver 1,000 h.p. at 20,000 feet, where the top speed was 340 m.p.h. Armament remained the Air Corps' standard of one ·50 calibre and one ·30 calibre machine gun. Although an all-metal machine, the XP-37 differed from its contemporaries in being finished all over with silver paint.

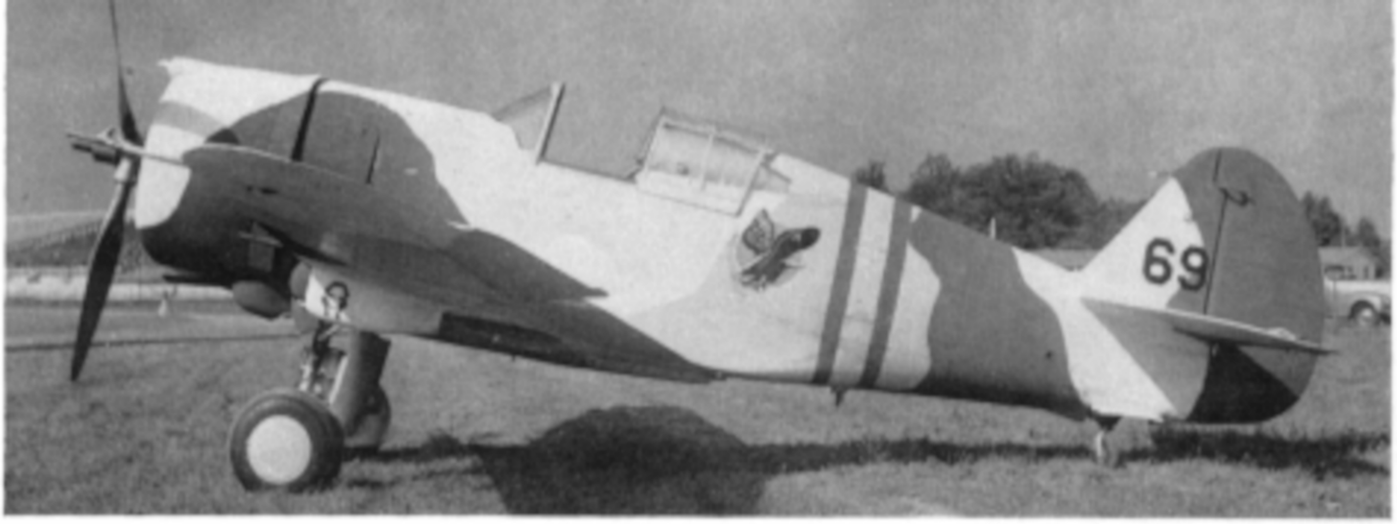
Following initial evaluation of the XP-37, which was delivered on 1st April 1937, the Air Corps ordered thirteen service test versions as YP-37 (serial numbers *38-472* to *38-484*). These were somewhat heavier than the prototype, had the pilot moved forward slightly, and were finished in natural metal. Powerplant was the V-1710-21 Allison, delivering 1,000 h.p. for take-off and 880 h.p. at 25,000 feet, where the top speed was 331 m.p.h. Delivery was made in June 1939, but no



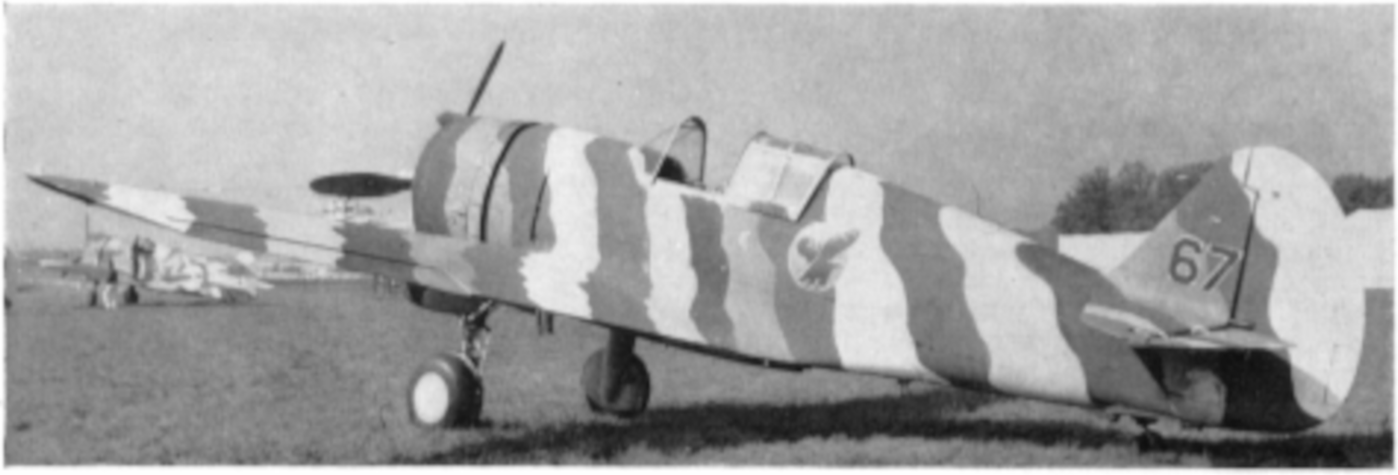
Left: *P-36B, a temporary designation assigned to P-36A* 38-20 *while being used as a test-bed for a 1,100-h.p. R-1830-25 engine.* Right: *The single XP-36D was created by installing ·30 calibre machine guns in each wing panel of P-36A* 38-174. *Note segmented colouring on cowling of an aeroplane used by a Group Headquarters Squadron.* (Photos: U.S.A.F.)

Left: *The XP-36 was P-36A* 38-172 *fitted with 23-mm. Madsen cannon under the wings. Markings are for Group Headquarters Squadron of the Eightieth Pursuit Group, aircraft No. 10.* Right: *Hawk 75M, production version of the 75H demonstrator; the first of 112 Hawk 75Ms, production versions of the 75H demonstrator sold to China. Note enlarged rear-view panels behind the cockpit.* (Photos: Curtiss-Wright)





Above: *A P-36C, probably of the 27th Pursuit Squadron, with the experimental camouflage of the 1939 War Games. The external underwing ammunition box for the ·30 calibre wing guns is clearly visible.* (Photo: courtesy Gordon S. Williams.) Below: *Another P-36C with a different War Games camouflage pattern; these schemes were applied with washable paint and could easily be removed.* (Photo: courtesy William T. Larkins)



further interest was shown in the design because a later Allison-powered adaption of the 75 known as the XP-40 held greater promise as a suitable fighter.

MODELS 75J AND K. These were studies for 75s powered with a turbo-supercharged "Twin Wasp" and a new 1,200-h.p. Pratt & Whitney "Twin Hornet" but were not built.

MODEL 75L. As a result of testing the three Y1P-36s, the Air Corps placed an order for 210 improved P-36As in July 1937. The first production machines were delivered in April 1938. The only outward recognition feature that distinguished them from the Y1P-36 was the addition of cowl flaps. The fourth and tenth airframes were held at the factory for conversion to new experimental prototypes and only 178 were delivered as P-36A. The last thirty were completed as P-36C. Others delivered as P-36A were modified in service and given new designations. The military designations of all Model 75Ls are listed below:

P-36A. 210 ordered, with Army serial numbers *38-1* to *38-210*. P-36As were the main fighter defence of the Hawaiian Islands at the time of the Pearl Harbour attack in December 1941 and were the first Air Corps fighters to shoot down Japanese aircraft. In the process of being replaced by P-40s at the time, the surviving P-36As were relegated to training rôles. One survives today in the Air Force Museum at Wright-Patterson Air Force Base near Dayton, Ohio.

P-36B. The twentieth P-36A, *38-20*, was fitted temporarily with a 1,100-h.p. R-1830-25 engine in November 1938. This increased power and the better altitude capability of the engine gave the machine, redesignated P-36B, a top speed of 313 m.p.h. The P-36B was actually an engine test-bed rather than a development model of the aeroplane, and was soon reconverted to a standard P-36A.

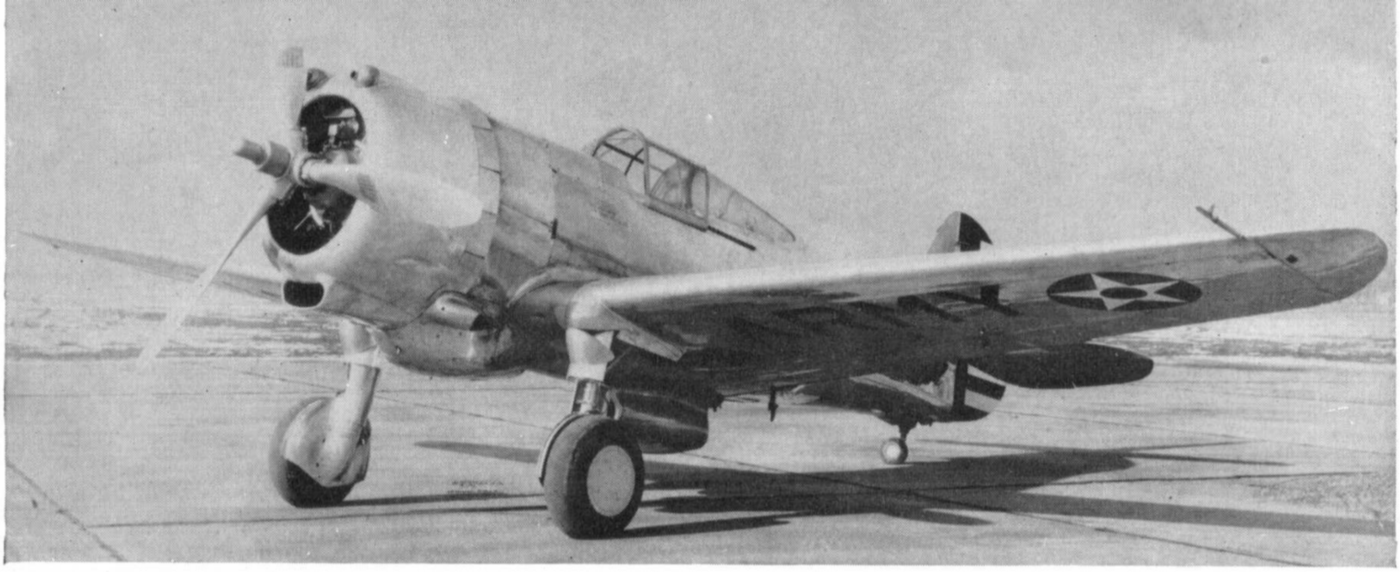
P-36C. The eighty-fifth P-36A, *38-85*, was fitted with an additional ·30 calibre machine gun in each outer wing panel. Ammunition was carried in an external box fitted to the underside of the wing. The additional armament proved to be desirable, so the last thirty machines on the P-36A order, *38-181* to *38-210*, were completed as P-36C. These differed from the prototype in being fitted with the 1,200-h.p. R-1830-17 engine.

XP-36D. The 174th P-36A, *38-174*, was withdrawn from squadron service early in 1939, redesignated XP-36D, and fitted with improved wing armament consisting of four ·30 calibre machine guns with ammunition carried internally in the manner of the later H75A-2. The nose armament was changed to two ·50 calibre guns.

XP-36E. The 147th P-36A, *38-147*, was fitted with new outer wing panels containing four ·30 calibre guns each. The nose ·50 calibre gun was retained but was rendered inoperable.

XP-36F. The 172nd P-36A, *38-172*, retained the standard nose armament of the P-36A but carried a single 23-mm. Madsen automatic cannon under each wing.

MODEL 75M. 112 production versions of the Model 75H fixed-undercarriage demonstrator delivered to the Republic of China. While virtually obsolete by the standards of the major powers, the 75Ms were the highest performance machines seen in China up to that time and were a bit beyond the capabilities of the average Chinese pilot of the time.



H-75R was the designation of a company-owned version of the standard P-36A fitted with a turbo-supercharger mounted between the engine and the wing. (Photo: U.S.A.F.)

The majority were destroyed in training accidents without ever encountering a Japanese aeroplane.

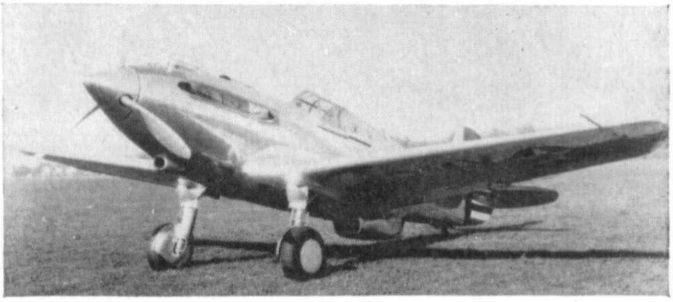
MODEL 75N. Thailand (formerly Siam) purchased twenty-five Model 75Ns, similar to the Chinese 75M except for one additional ·30 calibre gun in each wing. These saw combat in two wars, the Thai invasion of Indo-China in January 1941 and the brief defence of Thailand against the Japanese in December of the same year.

MODEL 75O. Thirty "Cyclone"-powered fixed-undercarriage Model 75Os with six ·30 calibre wing guns were sold to Argentina in 1938. A manufacturing licence was granted and 200 of the model were built by the Argentine Government in 1940.

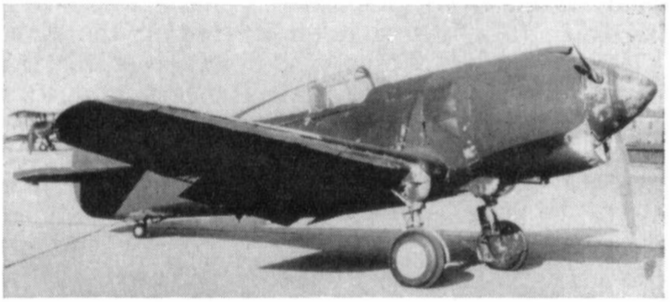
MODEL 75P. The tenth P-36A, *38-10*, was retained at the factory to serve as the prototype for still another Allison-powered version of the Model 75. Designated XP-40, this was more nearly a re-engined P-36A than the XP-37 had been since it was not necessary to move the cockpit aft. The weight change was compensated for by locating the radiator behind the wing in the manner of the later North American P-51. Powerplant was the Allison V-1710-19, delivering 1,160 h.p. for take-off and 1,000 h.p. at 10,000 feet without need for a turbo-supercharger. Delivered in October 1938 the XP-40 had a top speed of 342 m.p.h. at 12,200 feet. Armament was still the standard ·30 and ·50 calibre set of nose guns. After undergoing considerable refinement and a notable relocation of the radiator to the nose, the P-40 design went into production as the Curtiss Model 81 (see *Profile* No. 35).

MODEL 75R. A company-owned demonstrator generally similar to a P-36A and painted in Air Corps markings was fitted with a turbo-supercharger and submitted to the Army for test under the designation of Model 75R. The supercharger was installed beneath the nose just aft of the engine cowling while the intercooler was mounted under the trailing edge of the wing. The complications of this installation ruled out supercharged versions of the P-36 and the demonstrator was returned to Curtiss. It was subsequently fitted with a Wright "Cyclone" and continued as a demonstrator in civil markings with the registration *NX-22028*.

MODEL 75S. The fourth P-36A, *38-4*, was retained at the factory to be fitted with an experimental version of the "Twin Wasp" that was developed to determine if the streamlining advantages of the liquid-cooled "Vee" engine could be imparted to the air-cooled radial. The nose portion of the 1,050 h.p. P. & W. R-1830-31 engine was extended considerably and the propeller was fitted with an exceptionally large spinner. Cooling air was taken in through an airscoop below the spinner in a position matching that of the radiator on a liquid-cooled engine. Tested in March 1939 this strategem increased the top speed of the XP-42, as the Air Corps had named the Model 75S, to only 315 m.p.h., not enough to justify the develop-

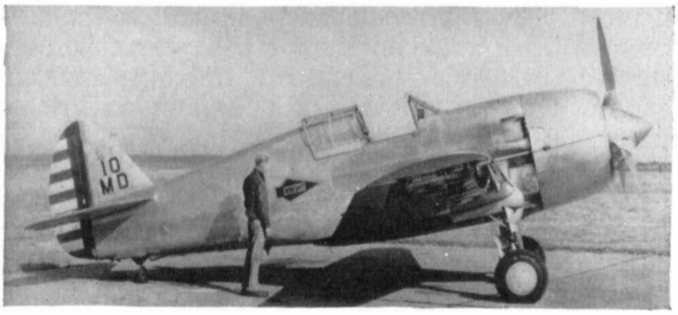


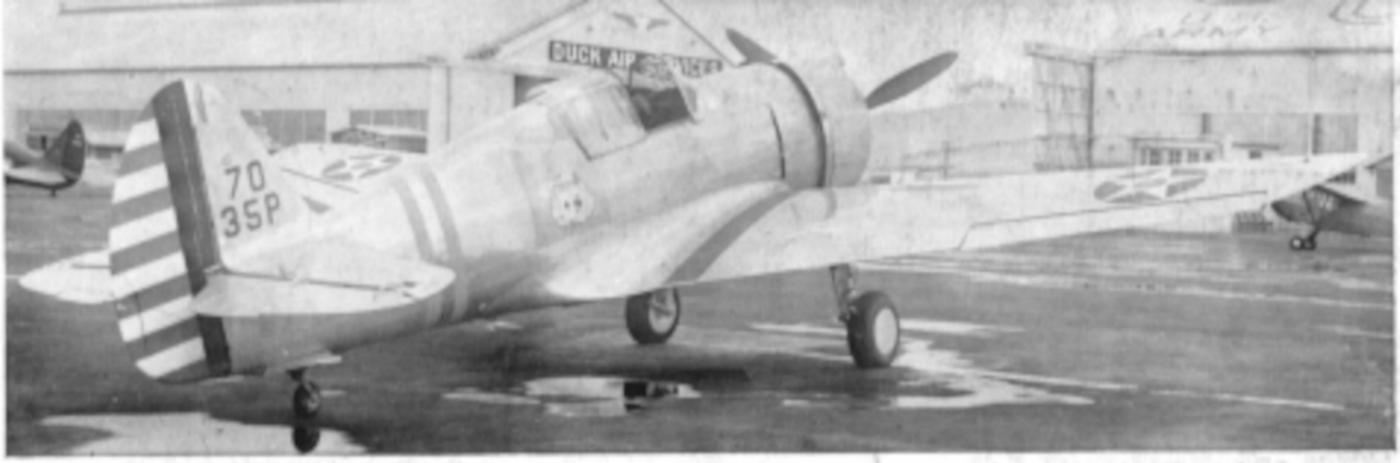
Curtiss assigned the designation of 75P to the Allison-powered conversion of P-36A 38-10 *that was delivered to the Air Corps as XP-40.* (Photo: U.S.A.F.)



The fourth P-36A was retained at the factory for conversion to XP-42 (Curtiss Model 75S) with long-nose P. & W. "Twin Wasp" engine. Washable camouflage was added when the XP-42 participated in the 1939 War Games. (Photo: U.S.A.F.)

Below: *The XP-42 was used for other engine testing after the long-nose idea was abandoned. Tail designation letters identify 10th aeroplane of the Materiel Division at Wright Field. Note Wright Field arrowhead insignia.* (Photo: N.A.S.A.)





P-36A, leader of the 77th Pursuit Squadron of the 35th Pursuit Group. Command stripes and engine cowling painted in yellow, the squadron identifying colour. (Photo: the author)

ment of a new engine. When used later as a test-bed for "Twin Wasp" engines of more conservative dimensions, the XP-42 showed a top speed of 343 m.p.h.

COLOURING AND MARKINGS

The prototype, although a civilian aeroplane, was painted in the standard Air Corps blue and yellow of the period but carried civil markings. By the time the Y1P-36s were delivered, the Air Corps had standardised on natural finish for all-metal machines. Those parts still covered with fabric, notably the movable control surfaces, were silver-doped. For the War Games of 1939, special experimental camouflage was applied to the participating P-36s in washable paint that covered all but the squadron insignia and the aeroplane number. This camouflage was extremely colourful, and included yellow, orange and white in addition to greens and browns. There was no uniformity—each machine had a different pattern.

Standard Air Corps olive drab warpaint was added to the top and side surfaces and undersides were painted grey starting in March 1941. When this warpaint was added, the colourful Army tail stripes were deleted, the stars on the upper right and lower left wings were deleted, and a star was added to each side of the fuselage.

By the time the P-36As entered service in 1938, operating units and individual aircraft of the G.H.Q. (General Headquarters) Air Force were identified by a combination of black block figures eight inches high on the vertical fin and across the upper surface of the left wing known as the designator. On the left wing undersurface, the lettering was reduced in size to squeeze it between the 24-inch letters of ARMY and the leading edge of the wing. The combination of the letters PA above the numeral 91 indicated that the machine was the ninety-first in the First (letter A, first in the alphabet) Pursuit Group (letter P-for-Pursuit). The number was usually repeated on the side of the engine cowling. The 20th Pursuit Group was identified by the letters PT, which took a little finger-counting to determine that "T" was the twentieth letter of the alphabet. This system was in use through 1938 and 1939. In 1940 it was revised for easier reading. The machine number was put at the top of the combination on the fin and the group designation was changed to use the actual group number first, then the type letter. The PT of the 20th Pursuit Group then became 20P. When warpaint was adopted, this lettering remained black, but was changed to yellow after Pearl Harbour.

Under both designator systems, the different squadrons within the group were identified by squadron insignia on each side of the fuselage aft of the cockpit and by the application of a distinctive squadron colour to the engine cowling. Aircraft assigned to the group's Headquarters Squadron had the cowling divided into segments, with one colour for each regular squadron (usually three) within the group. Squadron Commanders were identified by two vertical five-inch stripes around the fuselage forward of the tail. The leader of "A" Flight within the squadron had a single vertical stripe, and the leaders of "B" and "C" Flights had single stripes sloping forward and aft, respectively. All these "Command" stripes were in the squadron colour. This striping system was abandoned on all U.S. combat aircraft outside the U.S.A. following Pearl Harbour and was not re-adopted for overseas service until after the war. For the P-36s, therefore, it effectively ended in December 1941.

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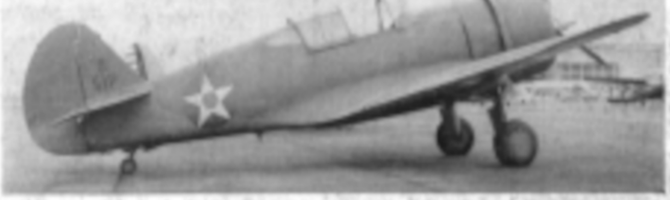
SPECIFICATIONS

	HAWK 75 (Export Hawk 75M)	**HAWK 75A (Model 75L, Army P-36A)**
Wing span	37 ft. 4 in.	37 ft. 4 in.
Length	28 ft. 7 in.	28 ft. 6 in.
Wing area	236 sq. ft.	236 sq. ft.
Empty weight	3,975 lb.	4,567 lb.
Gross weight	5,305 lb.	5,470 lb.
Undercarriage	Fixed	Retractable
Powerplant	Wright "Cyclone" GR-1820-G3 875 h.p.	P. & W. R-1830-13 or 17, 1,050 h.p. at 10,000 ft.
Maximum speed	280 m.p.h. at 10,700 ft.	313 m.p.h. at 10,000 ft.
Rate of climb	2,340 ft. per min.	4·8 min. to 15,000 ft.
Service ceiling	31,800 ft.	33,000 ft.
Range	1,210 miles (extra fuel). 547 miles (normal) at 10,700 ft. at 240 m.p.h.	825 miles at 270 m.p.h. at 10,000 ft.
Armament	one ·50, one ·30 calibre m.g., or one ·50 and three ·30; 300 lb. bombs	one ·50, one ·30 calibre m.g.; no bombs



P-36A, aeroplane No. 9 of the 51st Pursuit Group carrying the olive drab and grey warpaint adopted for U.S. combat aircraft in March 1941. Tail stripes eliminated and stars added to side of fuselage. (Photo: the author.)

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